Sarah Fong

Spring 2022 Semester Report

This semester, I participated in my second semester of in-person research with PhD student Justin Weatherford-Pratt. Over the course of the semester, I worked on various reactions in addition to third nucleophilic additions to tungsten-allyl complexes. At the beginning of the semester, I used a modified anisole tungsten-allyl complex to test different nitrogen-based nucleophiles, including beta-lactam.

I also performed isotopologue reactions that involved selectively adding deuterium to specific positions on a given compound as well as the synthesis of dinuclear species. An interesting result of this reaction is that I was able to add two deuterium to a single carbon on an anisole-tungsten complex. In exploring the synthesis of dinuclear species, I focused mainly on tungsten-allyl complexes with a 1,5-dihydroxynaphthalene substituent. What's interesting about this research is the ability to form polycyclic structures in a highly controlled manner.

In addition to the research I performed, I also learned more about different professional chemistry analytical techniques. For example, I obtained P-NMR after the synthesis of a reaction was performed in order to check the completion of the reaction using the phosphorous signal indicated by the PMe_3 substituent on the tungsten complex. I was also able to grow crystals of the products I obtained from reactions and perform X-ray crystallography on them in order to obtain their structures. I obtained two crystals and structures for a modified tungsten-allyl complex with a 3-methylanisole substituent and a structure involving 1,5-dihydroxynaphthalene. The 3-methylanisole complex crystal results were interesting as they revealed a different structure than that predicted by the 2D-NMR, depicted in Figure 1.

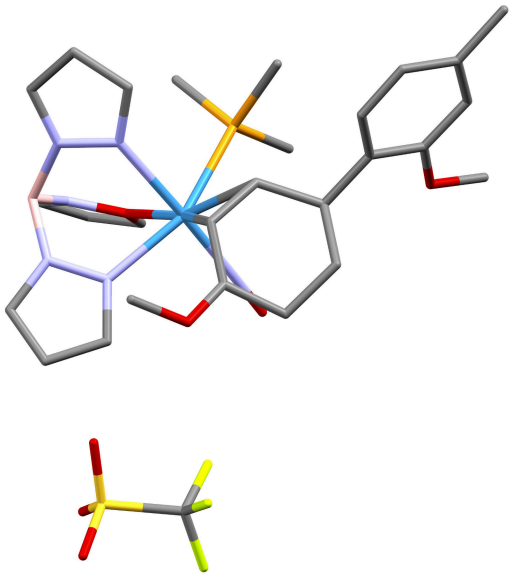

Figure 1. Crystal structure of 3-methylanisole tungsten-allyl modified complex